Section 12. User Interface

12.1 Introduction

This section describes the user interface for both the LPGS operator and analyst. The operator monitors the LPGS system and generates processing status and error reports as necessary. The analyst performs visual assessments of Level 1 digital images, and investigates the source of internal and external processing anomalies.

The Operator User Interface (OUI) is the primary interface between the operator and the LPGS subsystems (excluding the Quality Assessment and Anomaly Analysis subsystems). The interface uses Oracle Forms and X Window-based GUI displays to provide a menu-driven user interface.

The Analyst User Interface (AUI) is the primary interface between the analyst and the LPGS Quality Assessment and Anomaly Analysis subsystems. The interface uses ENVI (the Environment for Visualizing Images) and IDL (Interactive Data Language) running under X Window to provide a menu-driven environment for evaluation and assessment functions. Like the OUI, the AUI uses Oracle Forms.

12.1.1 Design Considerations

The OUI uses a set of standalone COTS applications that are compatible but loosely integrated. For instance, it is expected that the user will use Oracle Forms displays to monitor the processing status and to change the location of a work order in the processing queue.

The AUI uses ENVI and IDL running under X Window to provide menu access not only to built-in ENVI and IDL functions, but also to custom IDL applications and other COTS software needed for visual quality evaluation and anomaly analysis.

The screens in the OUI and AUI will employ the same look and feel to minimize specific operations.

12.1.2 Design Assumptions and Open Issues

The design assumptions for the LPGS user interface are as follows:

- The OUI runs on an X Terminal connected via Ethernet to an SGI Origin 2000
- The AUI runs on an SGI O2 workstation connected via FDDI to the LPGS system
- The same person may execute both the OUI and AUI
- A captured account runs the interface (no outside users)

12.1.3 Design/Development Tools

This subsection presents the tools used in designing/developing the user interface for operators and analysts. It is anticipated that the AUI will use some of the same tools as the OUI, but the OUI will not use any of the AUI image visualization tools.

12.1.3.1 Common Tools

Oracle Corporation's Cooperative Development Environment (CDE) tools are used for designing the OUI and AUI. CDE tools are built on top of a layer called the Oracle Toolkit. The Oracle Toolkit makes it possible to create platform independent applications. Applications can be developed in one environment (i.e., platform/GUI protocol combination) and seamlessly transferred to another environment. Oracle Forms and Oracle Reports are the CDE tools used to build the LPGS interface.

12.1.3.1.1 Oracle Forms

Oracle Forms is an integrated set of modules that assist in the development of Oracle applications. Oracle Forms consists of modules for building both forms and menus. The Forms module provides the capability to build and run screen-oriented applications for data entry, retrieval, and display. The Menus module provides facilities for building custom menus that can be attached to a form. By combining forms and menus, menu-driven applications can be built that execute multiple data processing tasks via a common interface.

12.1.3.1.2 Oracle Reports

Oracle Reports is an application development tool for building and generating reports that display information stored in an Oracle7 database. Oracle Reports is specifically designed for application development.

12.1.3.2 Analyst Tools

The ENVI and IDL software packages are used for designing and implementing the AUI. ENVI, written in IDL, provides a base set of menus to access its image analysis functions. IDL allows this base set to be customized and extended to enable access to additional IDL applications as well as to other COTS software.

12.1.3.2.1 ENVI (Environment for Visualizing Images)

ENVI is a software package designed for analyzing remote-sensing data, including panchromatic, multispectral, and hyperspectral imagery. Implemented in IDL, ENVI provides an extensive and extensible menu-driven GUI.

12.1.3.2.2 IDL (Interactive Data Language)

The IDL software package provides a complete computing environment for the analysis and visualization of data. IDL offers a set of widgets that allow the creation of complete GUIs. IDL also includes the Widget Builder, a graphical interface design tool.

12.2 User Tasks

This subsection identifies the primary interactive tasks conducted by the operators and analysts. Each task is described briefly in the following sections.

12.2.1 Operator Tasks

The types of tasks performed by the LPGS operator are categorized as follows:

- Work Order Tasks
- Accounting Tasks
- System Control Tasks
- Database Tasks
- Manual Override Tasks

12.2.1.1 Work Order Tasks

Work order tasks relate to monitoring and/or modifying the processing of a Level 1 Product Generation Request. Each request is converted to a Work Order within LPGS. The work order tasks provide functions allowing the operator to perform the following :

- Get processing status
- Control work order processing
- Display contents of a work order

The operator invokes the Get Processing Status function to obtain the current processing status of work orders. The database is automatically updated as each work order processing step is completed. Using display parameters, the operator can view the status of all active work orders or limit the view to those requiring action. This function also allows the operator to confirm the transfer of Level 1 products to ECS, as well as generate a processing status report.

The operator uses the Control Work Order function to influence the processing of work orders. By default, LPGS processes all Product Generation Requests on a first-in, first-out (FIFO) basis. The Control Work Order function allows the operator to promote the execution of a work order by moving it to the front of the processing list. The operator can also cancel a Product Generation Request, resume the processing of a paused work order, or select a work order for reprocessing.

To view the contents of a work order, the operator invokes the Display Contents function. This function requires the selection of a specific work order. Once selected, the contents of the work order are displayed.

12.2.1.2 Accounting Tasks

Accounting tasks enable the operator to generate LPGS productivity and quality reports. The Generate Accounting Reports function is used to summarize LPGS system performance for output to the DAAC Manager. It is also used to display the production quality report. The function provides for formatted text entry as well as the ability to incorporate graphics generated by data analysis packages.

12.2.1.3 System Control Tasks

System control tasks permit the operator to control and monitor the LPGS system. These tasks allow the operator to perform the following:

- Start LPGS
- Monitor system resources
- Modify system parameters
- View system messages and alerts (i.e., monitor system status)
- Shutdown LPGS

The Start LPGS function is used by the operator to control the startup of LPGS processing. This function provides an orderly initiation of LPGS.

The operator invokes the Monitor System Resources function to check disk space, I/O, and CPU usage. Nominally the software deletes files at appropriate times. Using the Monitor System Resources function, the operator can manually select files for deletion. Similarly, the operator may select files to be saved.

The Modify System Parameters function permits the operator to change processing controls and limits for the LPGS system, as well as system error thresholds. For instance, the operator may change the parameter that specifies the maximum number of work orders that can be simultaneously processed or to turn on the capability for PCS to handle ECS product generation cancellation requests without operator intervention.

Work orders generate system messages for critical events. The operator uses the View System Messages function to review the system messages log. Via this function, the operator can detect abnormal system conditions.

The operator uses the Shutdown LPGS function to terminate LPGS processing in a controlled manner. The shutdown option halts the submission of new work orders, but allows current work orders to complete processing. The operator can suspend the processing of current work orders by invoking the Control Work Order function and then setting the appropriate control parameter. After the appropriate control parameter is changed, work order processing is suspended after the completion of the currently executing script.

12.2.1.4 Database Tasks

The database tasks allow the operator to review the contents of the database using predefined or ad hoc queries. By directing output to a file, the operator may save query results and generate reports.

12.2.1.5 Manual Override Tasks

In the event of a software error requiring a temporary operational workaround, manual override tasks can be used. These tasks provide the operator with functions to manually perform the following:

- Transmit characterization results
- Acknowledge L0R product receipt
- Generate accounting reports

Normally, the characterization results gathered by LPGS are automatically transferred to IAS at set intervals (e.g., once a day or once a week) set by the operator. The operator can invoke the Transmit Characterization Results function to override the scheduled transfer and immediately sent the characterization results to IAS.

In the event of network communication problems with ECS, L0R data can be received by the LPGS operator on removable media (e.g., diskette or tape) and manually loaded onto the system. When this alternate transfer method is used, the operator invokes the Acknowledge L0R Product Receipt function to notify LPGS that L0R data is available for processing. After receiving this notification, LPGS can begin processing the L0R data.

LPGS is also required to generate reports concerning system processing usage. By invoking the Generate Accounting Reports function, the operator can produce summary and detail reports that provide information concerning system status and throughput.

12.2.2 Analyst Tasks

The primary tasks of the LPGS analyst are as follows:

- Display LPGS data
- Review and analyze thresholds
- Review and analyze scripts
- Generate custom work orders

12.2.2.1 Display LPGS Data

The Display LPGS Data function provides the analyst with a variety of tools for displaying the inputs to and the results of Level 1 processing. Included are capabilities for ASCII file display, formatted binary file display, and graphical image display. This function permits the analyst to view the contents of all input, intermediate, and final product files, including the associated work order and Level-1 Product Generation Request. The Display LPGS Data function will support the visual quality assessment of Level 1 products.

12.2.2.2 Review and Analyze Thresholds

The Review and Analyze Thresholds function allows the analyst to review and modify the default thresholds for radiometric and geometric processing. Additionally, this function is used to review and modify the data quality assessment limits.

12.2.2.3 Review and Analyze Scripts

The Review and Analyze Scripts function allows the analyst to review and modify the scripts that control work order processing. Via this function the analyst can create a custom script for anomaly analysis that will specify image processing intermediate output options.

12.2.2.4 Generate Custom Work Orders

The Generate Custom Work Orders function is used by the LPGS analyst to submit work orders for reprocessing. This function permits the analyst to modify the contents of an existing work order. Input for these work orders will be derived from problem/anomaly reports assigned to LPGS by the DAAC Manager.

12.3 User Interface Architecture

This subsection presents the architecture for the OUI and AUI.

12.3.1 OUI Architecture

TBS

12.3.2 AUI Architecture

TBS